

Appl. No. 10/522,116
Amd. Dated February 23, 2007
Reply to Office Action Dated June 25, 2007

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FEB 25 2008

Amendments to the Claims:

This listing of the claims will replace all prior versions, and listings, of the claims in the application.

Listing of Claims:

Please amend the claims as follows without prejudice. No new matter has been added by way of these amendments.

1. (Original) A method of drilling a borehole from a selected location in an existing wellbore penetrating a subterranean earth formation having at least one hydrocarbon bearing zone wherein the existing wellbore is provided with a casing and a hydrocarbon fluid production conduit is arranged in the existing wellbore in sealing relationship with the wall of the casing, the method comprising:

- passing a remotely controlled electrically operated drilling device from the surface through the hydrocarbon fluid production conduit to the selected location in the existing wellbore;
- operating the drilling device such that cutting surfaces on the drilling device drill the borehole from the selected location in the existing wellbore thereby generating drill cuttings

wherein during operation of the drilling device, a first stream of produced fluid flows directly to the surface through the hydrocarbon fluid production conduit and a second stream of produced fluid is pumped over the cutting surfaces of the drilling device via a remotely controlled electrically operated downhole pumping means and the drill cuttings are transported away from the drilling device entrained in the second stream of produced fluid.

2. (Original) A method as claimed in Claim 1 wherein the existing wellbore has an upper cased section and a lower uncased section.

3. (Previously presented) A method as claimed in Claim 1 wherein the cutting surfaces of the drilling device are located on a drill bit or mill that is provided at or near the lower end of the

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drilling device and optionally on a drill bit or mill that is provided at or near the upper end of the drilling device.

4. (Original) A method as claimed in Claim 3 wherein the drill bit or mill is expandable thereby allowing the borehole that is drilled from the selected location to be of a larger diameter than the inner diameter of the production conduit.

5. (Currently amended) A method as claimed in Claim 3 wherein ~~the~~ the drilling device is provided with an electrically operated steering means for the drill bit or ~~mill~~ mill.

6. (Previously presented) A method as claimed in Claim 3 wherein the drilling device is provided with an electric motor for actuating a means for driving the drill bit or mill.

7. (Previously presented) A method as claimed in claim 1 wherein the drilling device is provided with the electrically operated pumping means.

8. (Previously presented) A method as claimed in claim 1 wherein the drilling device is provided with an electrically operated traction means.

9. (Previously presented) A method as claimed in claim 1 wherein the borehole that is drilled from the selected location is (a) a new section of wellbore; (b) a window in the casing of the existing wellbore or a window in the production conduit and casing of the existing wellbore; (c) a perforation tunnel in the casing and cement of the existing wellbore; or (d) an enlarged borehole through at least a section of the existing wellbore having mineral scale deposited on the wall thereof.

10. (Previously presented) A method as claimed in claim 1 wherein the drilling device is suspended from a cable that encases at least one wire and/or segmented conductor for transmitting electricity or electrical signals.

11. (Original) A method as claimed in Claim 10 wherein the drilling device is suspended from the cable via a releasable connection means.

12. (Previously presented) A method as claimed in Claims 10 wherein the borehole that is drilled from the selected location is a new wellbore section and wherein at least a lower section of the cable from which the drilling device is suspended lies within a length of tubing having a first end that is in fluid communication with a fluid passage in the drilling device and a second end that extends into the hydrocarbon fluid production conduit.

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13. (Original) A method as claimed in Claim 12 wherein the tubing is steel tubing or plastic tubing.
14. (Currently Amended) A method as claimed in Claim 13 wherein the second stream of produced fluid is passed to the drilling device through the annulus formed between the tubing and the wall of the new section of wellbore and the entrained cuttings stream is transported away from the drilling device through the interior of the tubing ("reverse circulation" mode).
15. (Original) A method as claimed in Claim 13 wherein the tubing is steel tubing and the second stream of produced fluid is passed to the drilling device through the interior of the steel tubing and the entrained cuttings stream is transported away from the drilling device through the annulus formed between the steel tubing and die wall of the new section of wellbore ("conventional circulation" mode).
16. (Previously presented) A method as claimed in Claim 12 wherein the drilling device is provided with an electrically operated traction means to advance the drilling device and tubing through the new wellbore section as it is being drilled and/or to withdraw the drilling device from the new wellbore section and existing wellbore after completion of the drilling of the new wellbore section.
17. (Previously presented) A method as claimed in Claim 12 wherein the tubing is steel tubing and a housing is attached either directly or indirectly to the second end of the steel tubing and the interior of the steel tubing is in fluid communication with a passage in the housing.
18. (Original) A method as claimed in Claim 17 wherein the maximum outer diameter of the housing is less than the inner diameter of the production conduit.
19. (Currently amended) A method as claimed in Claims 17 wherein the housing attached to the second end of the steel tubing is provided with an electrically operated pumping means either for passing the second stream of produced hydrocarbon through the interior of the steel tubing to the drilling device ("conventional circulation" mode) or for drawing the entrained cuttings stream away from the drilling device through the interior of the steel tubing ("reverse circulation" mode).
20. (Previously presented) A method as claimed in Claim 17 wherein the housing attached to the second end of the steel tubing is provided with electric motor for actuating a means for rotating

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the steel tubing thereby rotating the drilling device so that the cutting surfaces on the drilling device drill the new section of wellbore.

21. (Previously presented) A method as claimed in Claims 17 wherein the housing attached to the second end of the steel tubing is provided with an electrically operated traction means for advancing the steel tubing and hence the drilling device through the new wellbore section as it is being drilled and optionally for withdrawing the steel tubing and hence the drilling device from the new wellbore section.

22. (Previously presented) A method as claimed in Claim 13 wherein the steel tubing is provided with at least one radially expandable packer and after completion of drilling of the new wellbore section, the steel tubing is locked in place in the new wellbore section by expanding the at least one radially expandable packer so that the steel tubing forms a sealed liner for the new wellbore section.

23. (Currently amended) A method as claimed in Claim 13 wherein the steel tubing is expandable tubing and is capable of being passed through the hydrocarbon fluid production conduit in its non-expanded state and, after completion of the drilling of the new wellbore section, is capable of being expanded to form a liner for the new wellbore section.

24. (Previously presented) A method as claimed in Claim 22 wherein the steel tubing is subsequently perforated to allow fluid to flow from the hydrocarbon-bearing zone of the formation into the interior of the liner and into the hydrocarbon fluid production conduit.

25. (Previously presented) A method as claimed in Claim 12 wherein sensors are provided along the cable and along the outside of the tubing for transmitting data to the surface via the electrical conductor wire(s) and/or segmented electrical conductor(s) encased in the cable.

26. (Currently amended) A method as claimed in Claim 1 wherein the drilling device is suspended from a tubing having at least one electrical conductor wire and/or segmented electrical conductor embedded in the wall thereof (hereinafter "hybrid cable") and wherein the interior of the tubing is in fluid communication with a fluid passage in the drilling device.

27. (Original) A method as claimed in Claim 26 wherein the hybrid cable comprises an inner metal tube, an intermediate flexible insulation layer having the electrical conductor wire(s)

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and/or segmented electrical conductors) embedded therein, an outer fluid barrier layer and a flexible protective sheath.

28.(Currently amended) A method as claimed in Claim 26 of drilling a new wellbore section wherein either (a) the second stream of produced fluid is passed to the drilling device through the annulus formed between the hybrid cable and the wall of the new wellbore section and the entrained cuttings stream is transported away from the drilling device through the inner metal tube of the hybrid cable ("reverse circulation" mode); or (b) the second stream of produced fluid is passed to the drilling device through the inner metal tube of the hybrid cable and the entrained cuttings stream is transported away from the drilling device through the annulus formed between the hybrid cable and the wall of the new section of wellbore ("conventional circulation" mode).

29.(Previously presented) A method as claimed in Claim 26 wherein sensors are provided along the outside of the hybrid cable for transmitting formation data to the surface via the electrical wire(s) and/or segmented electrical conductor(s).

30.(Previously presented) A method as claimed in Claim 9 for drilling a side-track or lateral well comprising:

- passing a whipstock having radially extendable gripping means from the surface through the hydrocarbon fluid production conduit to the selected location in the casing or production conduit of the existing wellbore;
- locking the whipstock into place either in the casing of the existing wellbore or in the production conduit by radially extending the gripping means;
- lowering a first drilling device comprising a mill., suspended from a cable, through the hydrocarbon production conduit to the selected location;
- deflecting the first drilling device against the whipstock such that the cutting surfaces of the mill engage with the casing or production conduit;
- operating the first drilling device such that a window is milled through the casing of the wellbore or through the production conduit and casing of the wellbore;
- removing the first drilling device from the wellbore;
- lowering a second drilling device comprising a drill bit, suspended from a cable, through the hydrocarbon fluid production conduit to the selected location;

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- deflecting the second drilling device against the whipstock into the window in the casing or the window in the production conduit and casing; and
- operating the second drilling device such -that the cutting surfaces of the drill bit drill a side-track or lateral well through the hydrocarbon-bearing zone of the formation.

31.(original) A method as claimed in Claim 30 wherein the whipstock is passed to the selected location suspended from the first drilling device.

32-34 (Previously Cancelled)

35 (Cancelled) A hybrid cable as defined in Claim 26.